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(54) [Title of the Invention] Absorbent Article

(57) [Abstract]

[Problem]

To provide an absorbent article with good fitting properties and excellent leak

preventing properties.

[Resolution Means]

An essentially longitudinal absorbent article 1 having a liquid permeable front surface sheet 21, an absorbent body 31 as an absorbent layer with liquid retaining properties, and a back surface sheet 41 as a liquid impermeable leak preventing layer; further comprising an elastic stretchable sheet 20 that is attached by attaching parts 22 provided on both left and right sides in the longitudinal direction, formed with a three-dimensional shape with a recess on the surface side that contacts the skin in the longitudinal direction of a sanitary napkin, and the region between the pair of attaching parts 22 in the lateral direction of the sanitary napkin 1 is formed in a three-dimensional shape with the protrusion on the surface side that contacts the skin.

[Scope of the Patent Claims]

[Claim 1]

An essentially longitudinal absorbent article having a liquid permeable front layer, an absorbent layer with liquid retaining properties, and a liquid impermeable leak preventing layer; further comprising an elastic stretchable sheet that is attached to the absorbent article by attaching parts provided at least on both left and right sides in the longitudinal direction, a three-dimensional shape with a recess is formed on the surface side that contacts the skin in the longitudinal direction of the absorbent article, and a three-dimensional shape with a protrusion is formed on the surface side that contacts the skin in the region between the pair of attaching parts in the lateral direction of the absorbent article.

[Claim 2]

The absorbent article according to claim 1, wherein the three-dimensional shape that is formed in the region between the attaching parts is positioned essentially in the center area in the longitudinal direction and the lateral direction of the absorbent article.

[Claim 3]

The absorbent article according to claim 1, wherein the attaching parts are formed by a three-dimensional groove.

[Claim 4]

The absorbent article according to claim 1, wherein the elastic stretchable sheet is provided between the front surface layer and the absorbent layer.

[Claim 5]

The absorbent article according to claim 1, wherein the elastic stretchable sheet is a liquid permeable sheet, and forms the surface that contacts the skin of the absorbent article.

[Detailed Description of the Invention]

[0001]

[Technical Field of the Invention]

The present invention relates to an absorbent article such as a sanitary napkin or incontinence pad that has extremely favorable fitting properties and does not easily leak.

[0002]

[Conventional Technology and Problem To Be Solved by the Invention]

Conventionally, absorbent articles such as sanitary napkin made from a leak preventing layer and an absorbent layer provided on the leak preventing layer have become widely used. However, with conventionally used absorbent articles, the sanitary napkin could not track the movement of the crotch or the deformation of panties when the wearer performed vigorous exercises, and the sanitary napkin would shift and there were problems with liquid leaking. Furthermore, if loose panties are worn, the gap between the napkin and the excreting area will be large, and there will be a problem in that the frequency of increased liquid flow and leakage.

[0003]

Therefore, in order to resolve this problem, Japanese Examine Patent Application H9-507033 discloses a sanitary napkin with a two layer construction where the center region in the lateral direction of the top layer has a protrusion that protrudes upward, and patent WO97/07764 discloses a sanitary napkin where a top layer without an absorbent body has a center region in the lateral direction of the top layer that is made to protrude outward because of a string-like elastic member. However, with the sanitary napkins in these proposals, the fit to the wearer is insufficient, and a level that

sufficiently resolves the aforementioned problem is not achieved.

[0004]

Therefore, an objective of the present invention is to provide an absorbent article with good fitting properties and excellent leak preventing properties.

[0005]

[Summary of the Invention]

As a result of diligent research to resolve the aforementioned problems, the present inventors have discovered that the aforementioned objective can be achieved by an absorbent article where an elastic stretchable sheet is attached by at least two attaching parts in a stretched state, and the region between the attaching parts has a three-dimensional shape that forms a protruding surface shape of a protrusion on the surface side that contacts the skin.

[0006]

The present invention is based on the aforementioned findings, and provides an essentially longitudinal absorbent article having a liquid permeable front layer, an absorbent layer with liquid retaining properties, and a liquid impermeable leak preventing layer; further containing an elastic stretchable sheet that is attached to the absorbent article by attaching parts provided at least on both left and right sides in the longitudinal direction, a three-dimensional shape with a recess is formed on the surface side that contacts the skin in the longitudinal direction of the absorbent article, and a three-dimensional shape with a protrusion is formed on the surface side that contacts the skin in the region between the pair of attaching parts in the lateral direction of the absorbent article.

[0007]

[Description of the Preferred Embodiment]

The present invention will be described below in detail while referring to the drawings. Herein, FIG. 1 is a perspective view illustrating a sanitary napkin as the first embodiment of the absorbent article of the present invention, FIG. 2 is a cross-section view along line II-II of the sanitary napkin shown in FIG. 1, and FIG. 3 is a cross-section view along line III-III of the sanitary napkin shown in FIG. 1.

[0008]

A sanitary napkin 1 as the absorbent article of the present embodiment shown in FIG. 1 through FIG. 3 is essentially a longitudinal absorbent article with a front surface sheet 21 as a liquid permeable front surface layer, an absorbent body 31 as a liquid retaining absorbent layer, and a back surface sheet 41 as a liquid impermeable leak preventing layer. When each of the members that compose the sanitary napkin of the present embodiment are described, the front surface sheet 21, absorbent body 31, and back surface sheet 41 are not particularly restricted and can be any material that is normally used in absorbent articles such as a sanitary napkin.

[0009]

Furthermore, as shown in FIG. 1 through FIG. 3, the sanitary napkin 1 of the present embodiment further contains an elastic stretchable sheet 20 that is attached by attaching parts 22 provided on both left and right sides in the longitudinal direction, formed with a three-dimensional shape with a recess on the surface side that contacts the skin in the longitudinal direction of a sanitary napkin, and the region between the pair of attaching parts 22 in the lateral direction of the sanitary napkin 1 is formed in a three-dimensional shape with a protrusion on the surface side that contacts the skin.

[0010]

Further details are described below. The elastic stretchable sheet 20 is located between the front surface sheet 21 and the absorbent body 31 in a stretched condition. Furthermore, the elastic stretchable sheet 20 is attached to the front surface sheet 21 and the absorbent body 31 by grooves which function as attaching parts 22 that are formed by pressure welding the front surface sheet 21, the elastic stretchable sheet 20, and the absorbent body 31 in a stretched condition in the longitudinal direction between the front surface sheet 21 and the absorbent body 31. In other words, the attaching part 22 is formed by a three-dimensional groove. Furthermore, as shown in FIG. 1, both end parts 1a, 1b in the longitudinal direction of the sanitary napkin 1 are bonded to the front surface sheet 21, elastic stretchable sheet 20, and the back surface sheet 41, and both side parts 1c, 1d in the lateral direction of the sanitary napkin 1 is bonded to the front surface sheet 21 and the back surface sheet 41. The absorbent body 31 and back surface sheet 41 are bonded together by an adhesive such as a hot melt adhesive, and an adhesive such as a hot melt adhesive is applied to form a shift preventing part 5 in order to prevent shifting from the panties. The absorbent body 31 and the elastic stretchable sheet 20 are both rectangular shaped sheets with essentially the same shape.

[0011]

As shown in FIG. 1, the attaching part 22 has a curved shape such that the center region 22b is located closer to the inside in the lateral direction than both front and back ends 22a of the attaching part 22 on both left and right side parts of the sanitary napkin 1. The elastic stretchable sheet 20 is integrated with the front surface sheet 21 and the absorbent body 31 by the attaching parts 22, and therefore the contracting force of the elastic stretchable sheet is weaker at both outer sides in the lateral direction of the attaching parts 22, but the area between the left and right attaching parts 22 which is the area of the elastic stretchable sheet 20 without attaching parts will contract proactively in the longitudinal direction. Furthermore, because of this contraction, as shown in FIG. 3, the sanitary napkin 1 will have a three-dimensional shape with a curved surface that gradually curves to the side of the surface that contacts the skin in the longitudinal direction, and as shown in FIG. 2, the center region 2a of the sanitary napkin has a three-dimensional shape with a protruding curved surface in the lateral direction cross-section. In other words, the three-dimensional shape of the protruding curved surface is located essentially in the center region and the longitudinal direction and the lateral direction of the sanitary napkin. The elastic stretchable sheet 20 is preferably attached to the absorbent body 31 or the back surface sheet 41, but as shown with the present embodiment, the front surface sheet 21, elastic stretchable sheet 20, and absorbent body 31 are preferably integrated and bonded together. Because the elastic stretchable sheet 20 is bonded and attached not only to the front surface sheet 21, but also to the absorbent body 31, the ability to maintain the three-dimensional shape of the recess curved surface and the three-dimensional shape of the protrusion curved surface of the sanitary napkin 1 will be superior, and because the absorbent body is also integrated, the sanitary napkin will respond to the various stresses in the crotch region of females, deformation will easily be recovered, the fitting properties will be extremely favorable, and shifting will not easily occur. In this way, the three-dimensional shape in the region between the attaching parts and the three-dimensional shape in the longitudinal direction are each preferably in a recess curved shape and a protrusion curved shape on the side of the surface that contacts the skin in this manner from the perspective of the fitting properties and the feel when worn.

[0012]

The molding material of the elastic stretchable sheet 20 can be a film such as a polystyrene-polyisoprene copolymer, a polystyrene-polybutadiene copolymer, a

polyethylene- α -olefin copolymer, natural rubber, or polyurethane, a nonwoven material, a weave, or a multilayer sheet containing one of these films with a nonwoven material.

[0013]

Of the aforementioned materials, for those materials which do not easily express a stretching strength such as films or nonwoven materials made from materials which do not have heat sealing properties such as natural rubber as well as melt blow nonwoven materials, the stretching strength will be higher, so the heat sealing properties between the front surface sheet, absorbent body, and leak preventing material will be increased, and therefore these materials can be laminated with a thermoplastic nonwoven material made from polyethylene/polyester, polyethylene/polypropylene, or polypropylene, and used as a multilayer material.

[0014]

As described for the present embodiment, the elastic stretchable sheet 20 must have liquid permeability if located closer to the side of the surface that contacts the skin than the absorbent body 31, and a liquid permeable sheet such as a nonwoven material is preferable, and if a stretchable film is used, a film that has been slit processed or perforated in order to provide liquid permeability can also be used.

[0015]

The preferable stretching properties of the elastic stretchable sheet 20 are adjusted by the stretching properties, shrink ratio, and attach parts, such that when bonded and attached along the longitudinal direction and the lateral direction of the sanitary napkin, the preferable curvature of the recess curved surface shape on the surface that contacts the skin in the longitudinal direction and the preferable height of the protrusion curved surface shape in the lateral direction can be obtained.

[0016]

The curvature of the recess shape on the side of the surface that contacts the skin in the longitudinal direction of the sanitary napkin 1 (curvature when the sanitary napkin is viewed from the side surface without stress applied) preferably has a curvature radius r between 50 and 300 mm, and more preferably between 100 and 200 mm. If the curvature radius r is less than 50 mm, the napkin will be curved too strongly, the fit will be inferior, and attaching to the panties will be difficult, which is not preferable, but if the curvature radius r exceeds 300 mm, the curvature will be too gradual, and preferable

fitting properties to the body will be difficult to obtain, which is also not preferable. The height h (refer to FIG. 2) of the three-dimensional shape of the protrusion curved surface of the stretchable parts in the lateral direction is preferably between 3 and 30 mm, and more preferably between 5 and 20 mm. If the height is less than 3 mm, good fitting properties in the center region will not be obtained, and the leak preventing capability will be weak, but if the height exceeds 30 mm, the center region will cause an unpleasant feel, which is not preferable.

[0017]

Obtaining a preferable curvature radius r and height h of the three-dimensional shape of the protrusion curved surface in the lateral direction is related to the stretching properties of the stretchable material, the shrink ratio, and the attaching parts 23 in the lateral direction of the elastic stretchable sheet material. The stretching properties of the elastic stretchable sheet 20 are such that the stress when stretched between 5 and 50% in the longitudinal direction of the sanitary napkin 1 is preferably between 50 and 500 gf/25 mm wide, and more preferably between 100 and 300 gf/25 mm wide. If the stress is less than 50 gf/25 mm wide, the stretching force will be too weak, a preferable curvature will not be obtained, and a preferable height h of the center region will not be obtained, which is not preferable, but if the stress exceeds gf/25 mm wide, the curvature in the longitudinal direction will be too strong and the fitting properties will be inferior, which is not preferable. Furthermore, with regards to the attaching parts 22 in the lateral direction of the elastic stretchable sheet material, the minimum width D between the left and right attaching parts 22, 22 (refer to FIG. 2, the interval when the interval between attaching parts is a minimum, the interval in the center region in the longitudinal direction for the present embodiment) is preferably 10 mm or longer, and more preferably between 20 and 50 mm, in order to obtain a preferable height h of the three-dimensional shape of the protrusion curved surface. If the width D is less than 10 mm, the interval between attaching parts will be too narrow and the preferable height h will not be obtained, and a three-dimensional shape of a protrusion curved surface will not be obtained, which is not preferable.

[0018]

The length L of the attaching part 22 (refer to FIG. 1) is preferably 50 mm or longer. Note, the attaching parts 22 are not necessarily formed along the entire length in the longitudinal direction of the sanitary napkin 1. Furthermore, the attaching parts 22 can be formed by any means such as adhering with hot melt adhesive, heat sealing, or

compression groove embossing, but heat sealing or forming a three-dimensional groove by compression groove embossing is more preferable because attaching parts 22 which are grooves can function as a flexible axis, a three-dimensional shape of a protrusion curved surface will easily be achieved, and the front surface sheet 21, elastic stretchable sheet 20, and the absorbent body 31 can be integrated together. The shape of the attaching parts 22 is not particularly restricted so long as the aforementioned conditions I and D are satisfied, and can be a straight line, curved line, or circle or the like, but a curved line as shown in FIG. 1 is preferable over a straight line because a three-dimensional shape of a protrusion curved surface which easily fits to the crotch will be obtained, and a circle is more preferable because the front and back bonding can be performed at once.

[0019]

The attaching parts 22 can be formed with either a solid line pattern or a dotted line pattern, but for the case of a three-dimensional groove, a dotted line shape is preferable because the bonding strength between the elastic stretchable sheet 20 and the absorbent body 31 can be further increased by the surface area of the heat seal and the anchoring effect. For the case of a dotted line, the surface area of a single seal is preferably between 1 and 30 mm², and the pitch is preferably between 0.5 and 10 mm. If the surface area of the seal is less than 1 mm², sufficient seal strength will not be obtained, but if the surface area exceeds 30 mm², the attaching parts 22 will be hard, which is not preferable. Furthermore, if the pitch is less than 0.5 mm, only an anchoring effect similar to a solid line will be obtained, and there is a possibility that the bonding strength will not be to the desired level, but if the pitch exceeds 10 mm, the bonding strength may be too low, which is not preferable. Furthermore, the width W (refer to FIG. 2) of the attaching parts 22 is preferably between 0.5 and 5 mm. If the width is less than 0.5 mm, sufficient seal strength will not be obtained, but if the width exceeds 5 mm, the attaching parts will be hard, which is not preferable. Note, the elastic stretchable sheet 20 can be stretched not only in the longitudinal direction, but also in the lateral direction, but stretching only in the longitudinal direction is sufficient because the mechanical processes will become complex and the desired effect of the present invention can be sufficiently obtained by stretching only in the longitudinal direction.

[0020]

By forming as described above, a three-dimensional protrusion curved surface

and a three-dimensional recess curved surface will be formed as described above, and the mechanism thereof is as described below. First, when a region S and regions S' on the left and right parts of region S are separated, the elastic stretchable sheet 20 will extend in the longitudinal direction, and therefore the contraction force will act but the regions S' are integrated with the front surface sheet 21 and the absorbent body 31, so the contraction force will act preferentially on region S. Therefore, when viewed in the longitudinal direction, the top surface will curve to become a recessed surface as shown in FIG. 3 because of the contraction of the elastic stretchable sheet. Next, when viewed in the lateral direction, if the left and right areas are not attached, the curvature will only be in the front and back direction, and the lateral direction will remain flat, but the left and right areas are attached, so the regions S' will have a weak contracting force, and only region S will contract preferentially. Compared to regions S', the contracting force of region S will be stronger, and only region S will shrink, so as shown in the FIG. 3, regions S' will remain flat and a three-dimensional shape like the three-dimensional shape of a protrusion curved surface will be formed in the region between the attaching parts 22, 22 on the skin side.

[0021]

The sanitary napkin 1 of the present embodiment can be provided for use by attaching to panties or the like using the shift preventing part 5 similar to normal sanitary napkins. As described above, the sanitary napkin 1 of the present embodiment is shaped like a saddle as shown in FIG. 1 through FIG. 3 with the center part of the sanitary napkin (region S between the attaching parts 22) being curved to form a protrusion, and the front and back areas curved to form a recess, and therefore the three-dimensional shape of the protrusion curved surface of the center part will adhere appropriately to the crotch region of the female, and this three-dimensional shape will be formed from a stretchable material, so even if the female performs vigorous movements, the sanitary napkin will not normally shift from the excreting area (private area) because of the movement of the crotch region or deformation of the panties, the fitting properties will be favorable, and menstrual blood will always be stably absorbed, so the menstrual blood will not flow along the surface and leak, and thus leaking can be effectively prevented. Furthermore, with a conventional napkin, if loose panties are worn, the gap between the excreting part and the napkin will be large and the frequency of liquid flowing or leaking will be high, but with the sanitary napkin of the present embodiment, the center region (region S between the attaching parts) can smoothly deform in the thickness direction, so even if loose panties are worn, the excreting region

and the surface sheet 21 will continue to have a good fit, and leaking can be effectively prevented.

[0022]

The sanitary napkin 1 of the present embodiment can be manufactured as described below as shown in FIG. 4. Note, in FIG. 4, the surface sheet is not shown in order for the position of the elastic stretchable sheet to be easily seen. For example, the elastic stretchable sheet 20 is stretched to a desired elongation ratio in the longitudinal direction and overlaid in this condition onto an absorbent body 31 that has been cut and formed to the desired shape, and after overlaying a front surface sheet 21, the assembly is passed between heated emboss rollers to form grooves which form the attaching parts 22, and thereby integrating the front surface sheet 21, the elastic stretchable sheet 20, and the absorbent body 31. Next, an adhesive is applied to the non-surface sheet 21 side (back surface side) of the absorbent body 31 and the back surface sheet 41 is overlaid, and then the entire circumference on the front and back left and right sides of the sanitary napkin are heat sealed and then the surrounding edges are cut to obtain the sanitary napkin 1.

[0023]

Next, another form of an absorbent article of the present invention is described while referring to FIG. 5 and FIG. 6. Herein, FIG. 5 and FIG. 6 are cross-section views in the lateral direction illustrating another embodiment of the absorbent article of the present invention. Note, in the following description of the embodiment, the points which differ from the embodiment will be described in particular. For points which are not particularly described, the description from the description of the embodiment shown in FIG. 1 through FIG. 4 can be appropriately applied.

[0024]

With the sanitary napkin of the embodiment shown in FIG. 5, the elastic stretchable sheet 20 is positioned between the back surface sheet 41 and the absorbent body 31. Therefore, the elastic stretchable sheet 20 that is used with the present embodiment is not required to be a liquid permeable sheet, and a commonly known elastic stretchable sheet is not particularly required for use.

[0025]

With the sanitary napkin 1 of the embodiment shown in FIG. 6, the elastic

stretchable sheet 20 is located on the front surface side of the absorbent body 21, and the front surface layer consists only of the elastic stretchable sheet 20, and a front surface sheet is not used. Therefore, the elastic stretchable sheet of the present embodiment is made from a liquid permeable sheet and forms the surface that contacts the skin of the sanitary napkin.

[0026]

Note, the absorbent article according to the present invention is not restricted to the embodiments, and various alternatives are possible to the extent that the main points of the present invention are not violated. For example, the elastic sheet can be a type that shrinks during a secondary process such as heating after being attached, and in this case, attaching while stretching is not required. Furthermore, the left and right attaching parts can be formed on the back region in the longitudinal direction in order to improve the fit to the buttocks. Furthermore, the attaching parts of the elastic stretchable sheet are not required to be on the side edges so long as the attaching parts are formed on both the left and right sides in the longitudinal direction.

[0027]

(Effect of the Invention)

The absorbent article of the present invention has favorable fitting properties, can smoothly track the movement of the wearer when worn, and has excellent leak preventing properties.

[Brief Description of the Drawings]

FIG. 1 is a perspective view illustrating a sanitary napkin as a first embodiment of the absorbent article of the present invention.

FIG. 2 is a cross-section view along line II-II of the sanitary napkin shown in FIG. 1.

FIG. 3 is a cross-section view along line III-III of the sanitary napkin shown in FIG. 1.

FIG. 4 is a cross-section view showing the manufacturing process for the sanitary napkin shown in FIG. 1.

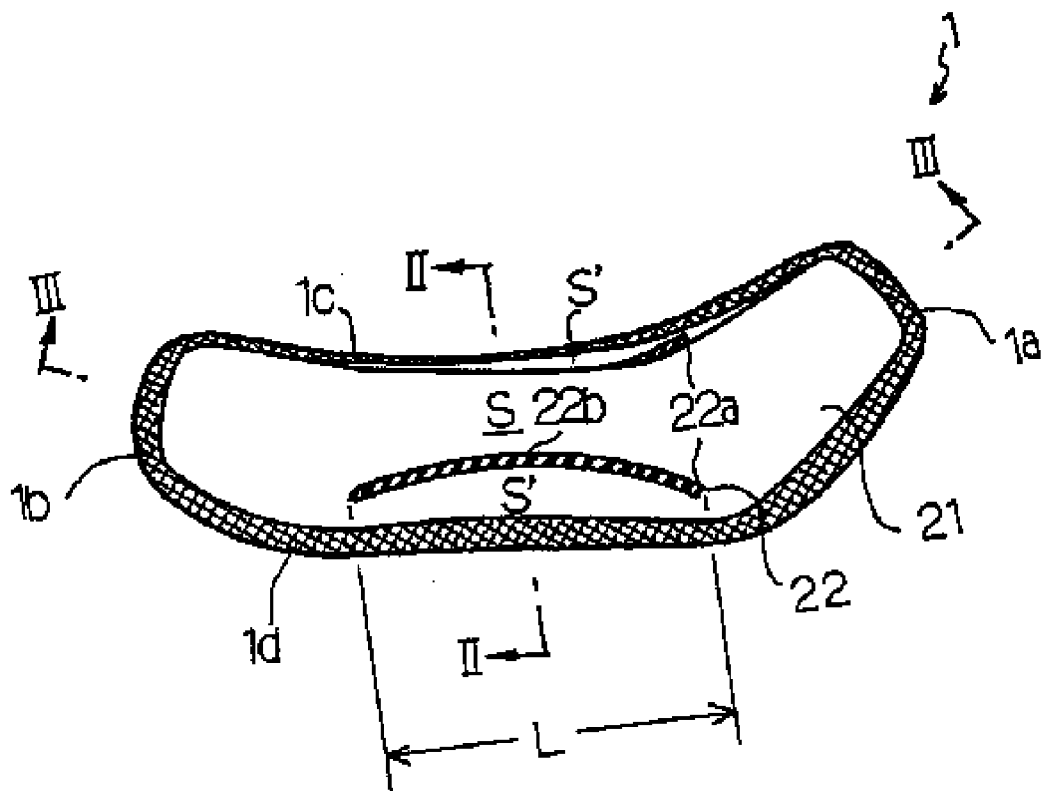
FIG. 5 is a cross-section view in the lateral direction showing a sanitary napkin as the second embodiment of the absorbent article of the present invention.

FIG. 6 is a cross-section view in the lateral direction showing a sanitary napkin as the third embodiment of the absorbent article of the present invention.

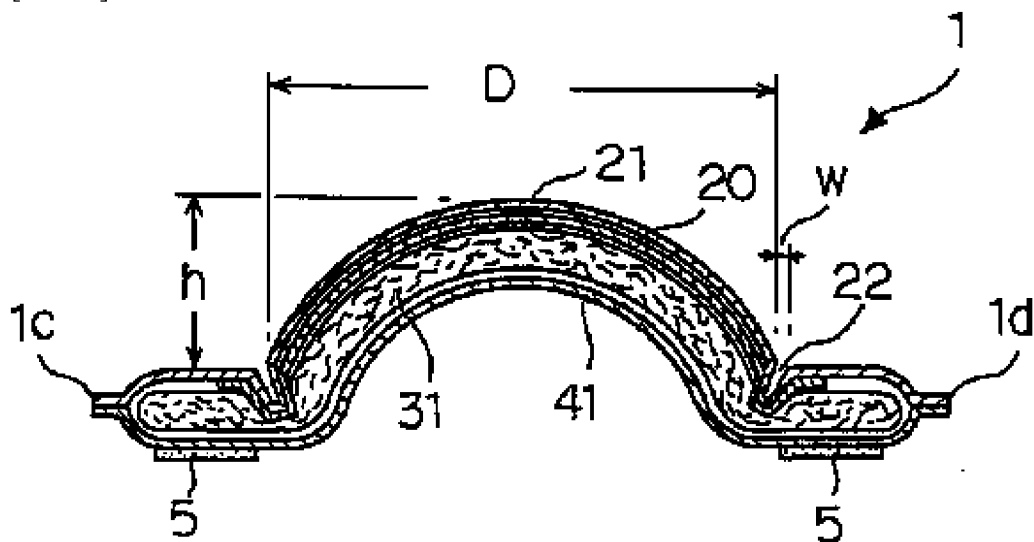
[Reference Numerals]

- 1 sanitary napkin
- 20 elastic shrinkable sheet
- 21 front surface sheet
- 22 attaching parts
- 31 absorbent body
- 41 back surface sheet
- 5 shift preventing material

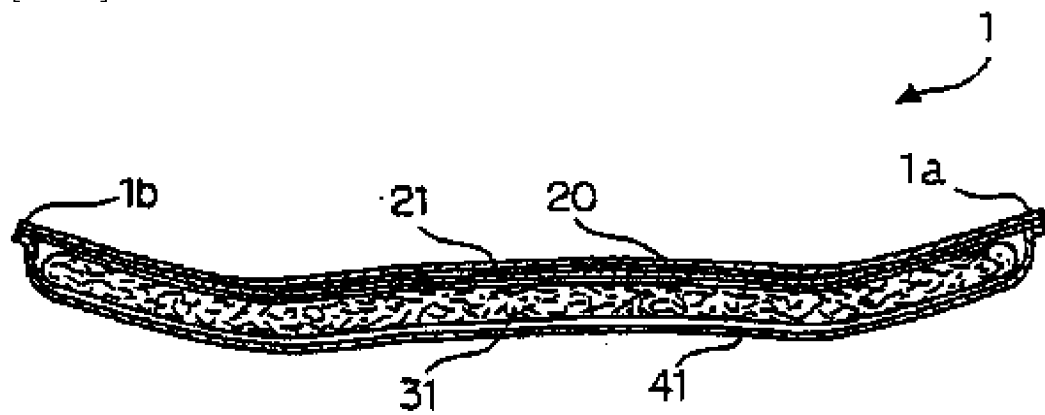
[FIG. 1]



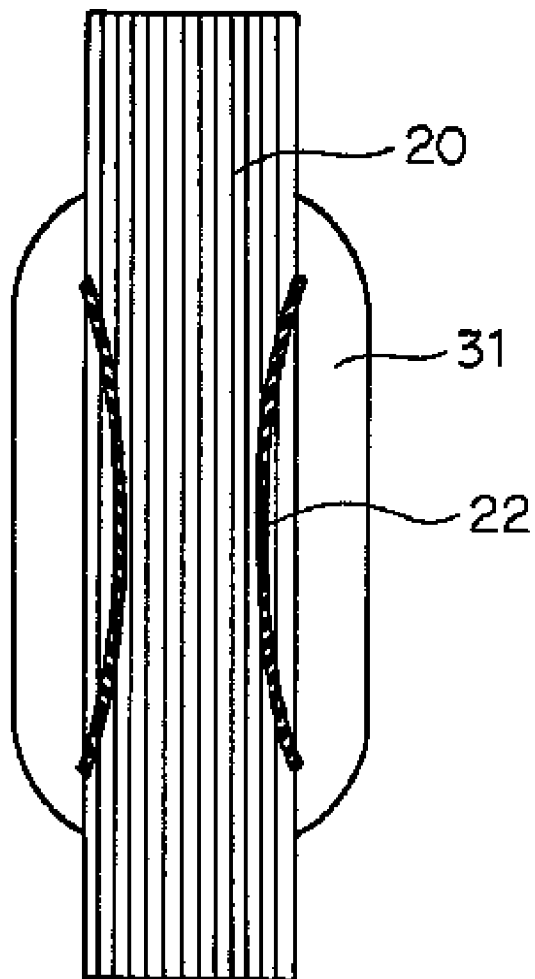
[FIG. 2]



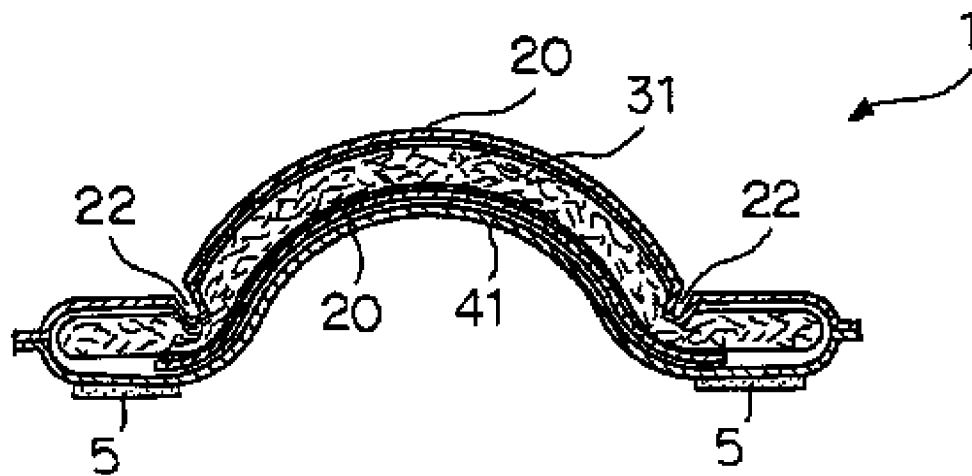
[FIG. 3]



[FIG. 4]



[FIG. 5]



[FIG. 6]

